The 40-year service anniversary of INL engineer Robert Phipps provides a chance to reflect on his career, which has contributed to global knowledge about how nuclear fuels and materials behave.

INL scientist celebrates more than 40 years of nuclear energy contributions

by Brett Stone, *INL Communications & Governmental Affairs intern*

Not many people would consider moving to eastern Idaho an improvement in their winter-weather outlook. But Robert Phipps, an Idaho National Laboratory scientist for more than 40 years, still has warm memories of his first Idaho winter day.

"I made an interview trip out here on Valentine's Day of 1967, and it was a beautiful winter day," said the Port Huron, Mich., native. "The job was interesting; the area seemed to be nice. It was one of those beautiful, bright blue sky days, relatively warm, snow on the mountains. You could see for miles."

But it's been more than comparatively nice weather that's kept Phipps in eastern Idaho for more than 40 years. He's been unassumingly but purposefully involved in helping solve the world's energy problems. His work at INL facilities contributed to global knowledge about how nuclear fuels and materials behave. From developing new examination techniques for irradiated fuel rods to helping reduce the toxicity of used fuel, Phipps has taken measured pride in his contributions toward nuclear energy's progress.

Phipps' work has included developing new examination techniques for irradiated fuel rods and helping reduce the toxicity of used fuel.

"Nuclear power needs to have, and I believe will have, a very significant effect on all aspects of energy production for generations to come," Phipps said. "And that isn't just generating the power — it also improves the security of our nation and the rest of the world."

Phipps first came to INL after attending Michigan State University and earning a degree in metallurgical engineering. He spent three years working at INL's Advanced Test Reactor Complex, where his metallography skills helped determine how intense irradiation in INL's Materials Test Reactor and Engineering Test Reactor affected nuclear reactor fuels.

When he transferred to Argonne National Laboratory-West (ANL-W, now the INL Materials & Fuels Complex) in 1970, "HFEF [the Hot Fuel Examination Facility] was not a whole lot more than a hole in the ground," he said. While at Argonne, he completed course work and a thesis on irradiation-induced swelling of stainless steel in the Experimental Breeder Reactor-II (EBR-II) to earn a master's degree from the University of Idaho.

"I've worked in a lot of different areas, generally related to hot-cell operations or nuclear facility operations," said Phipps. In the ensuing 35 years while he worked at ANL-W, his job included coordinating program work for the site, developing examination and process equipment for studying or reprocessing spent fuel, and directing refurbishment of hot-cell facilities.

At HFEF, Phipps supervised the engineers who developed a special kind of neutron radiography that researchers use to study nuclear fuels. The technique is similar to X-ray imaging that enables scientists to look through barriers to "see" the features inside. But similar to how CAT scans improved upon X-rays, the new neutron radiography technique allowed researchers to obtain a cross-sectioned view of objects such as irradiated nuclear fuel rods.

Phipps said his most satisfying work involved

The tool proved its worth in several safety experiments. At INL's Transient Reactor and Test Facility (TREAT) and Engineering Test Reactor (ETR), nuclear fuel assemblies were intentionally overheated to simulate a meltdown situation. The CAT-scan-style neutron radiography method was then used to analyze the assemblies so researchers could better understand what happens to nuclear fuel that gets too hot.

Phipps said his most fulfilling project involved refurbishing what is now known as the Fuel Conditioning Facility. There, Phipps spent 13 years working on developing the process equipment and transforming the facility to reprocess fuel from INL's Experimental Breeder Reactor-II (EBR-II). By separating the heaviest elements in spent fuel from other fission products, the material that

refurbishing what is now the Fuel Conditioning Facility, which contributed to fuel reprocessing knowledge.

has to be sent to a repository becomes drastically less radioactive and also provides a potential fuel source. Instead of the waste's radioactivity taking hundreds of thousands of years to dissipate, it takes about 300 years.

"It was probably the most satisfying," said Phipps of the program, because it has produced significant scientific knowledge about fuel reprocessing and it because it continues to process material from EBR-II beyond the expected life of the program.

When he's not working on solving technical problems involving neutrons, Phipps likes woodworking and spending time with his wife, Cathy, and their family. His four children, now married, live across a wide area of the United States, from Colorado to Alaska. He likes spending time with his nine grandchildren.

With all he's accomplished, Phipps isn't done yet. He plans on enjoying at least one more Idaho winter working at INL and perhaps more on a part-time basis. And he hopes that the work he's been involved in continues its upward course.

"I think the lab can and will have a significant impact on the energy environment that we have in the world in the future," he said. "When I decided to come here back in 1967, I recall saying to my wife, ‘We're getting in the elevator when it’s at the ground floor, and with nuclear power the only way to go is up.'

"Unfortunately at that point in time, the elevator was on the way down," he said. "I think I've seen it hit the bottom floor and come back up, maybe above where we were back in '67."

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